I^{2}C over Long Distances

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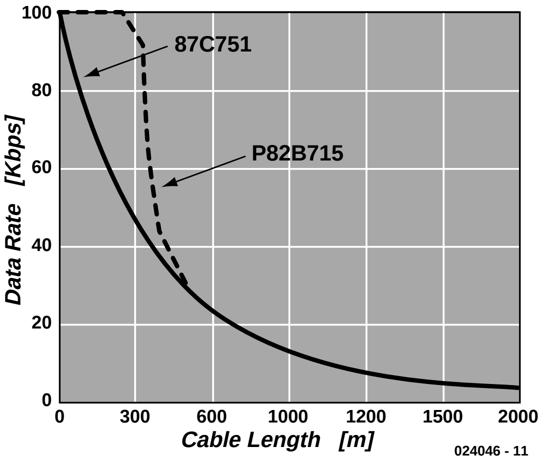
At the time that the I^{2}C bus was developed, a maximum bus capacitance of 400 pF was assumed. This means that with properly designed interconnections, in theory signal transport is possible over a distance of several metres. This initially appeared to be more than adequate, but the desire to be able to cover even longer distances soon arose. For this purpose, an ‘electronic transformer’ was developed in the form of a special IC with the type designation P82B715. Using this IC makes the signal impedance a factor of ten lower, which means that the maximum distance increases by the same factor. An ‘I^{2}C Extender’ based on this driver IC has already been described in the May 1994 issue of *Elektor Electronics*.

The nice thing is that it is now evident that ‘ordinary’ audio cable is eminently suitable for use as a transport medium, with distances of up to 300 m being attainable. With flat cable it is possible to go as far as 400 m if the leads between the signal leads (SCA and SCL) are connected to ground. Twisted-pair telephone cable scores quite a bit lower, with a maximum distance of 100 m. Even greater distances are possible, but only at the expense of transmission speed. The associated chart shows that the achievable data rate drops rapidly for distances greater than around 300 m. At a certain point, the decrease is so great that the P82B715 no longer has any effect and can just as well be omitted.



Readers that want to know all the details can download application notes AN444 and AB452 from the Philips website at www.semiconductors.philips.com.

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